ATTACHMENT - CLAIMS LISTING

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) Sound-absorbing device which is placed in a sound field ~~in~~ of open air for absorbing acoustic energy from the open air in said sound field at least in a predetermined low-frequency region, the device comprising:

a body containing one or more cavities, each said ~~body~~ cavity

including an active outer surface ~~with at least a portion thereof~~ in free and movable contact with the open air of said sound field and additionally being free and movable for absorption of acoustic energy from the open air of said sound field, and

having a volume which is movable in use at least by movement of said active outer surface in the open air of the sound field between states where the volume is one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, in order to change one of an absorption coefficient α or a resonance frequency of said body between a very high value and a very low value substantially lower than the very high value; and

a means for actively varying the gas pressure in said one or more cavities in use in order to actively vary at least one of the absorption coefficient α or the resonance frequency of said body between the very high value and the very low values substantially lower than the very high value.

2. (original) Sound-absorbing device according to claim 1, where said low-frequency region has an upper frequency limit of approximately 200 Hz.

3. (original) Sound-absorbing device according to claim 1, where said low-frequency region is 50 Hz to 125 Hz.

4. (currently amended) Sound-absorbing device according to claim 1, where a material of said body is chosen such that there exists a substantial impedance match between the body and the ~~surrounding~~ open air of the sound field, at least in said low-frequency region.

5. (previously presented) Sound-absorbing device according to claim 1, where said gas pressure is varied via a valve provided in a conduit between said at least one cavity and a source of gas, where the valve is provided with means for remote-controlling of the valve.

6. (previously presented) Sound-absorbing device according to claim 1, where the body is furthermore provided with an attachment mechanism for engagement with a corresponding attachment mechanism provided on one or more sound-absorbing devices.

7. (previously presented) Sound-absorbing device according to claim 1, where at least one of said one or more cavities is provided with sound-absorbing material within said cavity.

8. (withdrawn - previously presented) Sound-absorbing device according to claim 1, where at least one of said one or more cavities is provided with one of an internal self-inflating or self-expanding mechanism.

9. (withdrawn- previously presented) Sound-absorbing device according to claim 1, where said body is surrounded by one of an inflatable and collapsible frame structure or an expandable and compressible frame structure for providing at least one of a sufficient rigidity, a desired shape or a desired depth to said body.

10. (previously presented) Sound-absorbing assembly comprising:

at least one sound-absorbing device which is placed in a sound field in air for absorbing acoustic energy from said sound field at least in a predetermined low-frequency region, comprising

a body containing one or more cavities, said body including an outer surface with at least a portion thereof in contact with said sound field, and being movable between states where the body is one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, and

a means for actively varying the gas pressure in said one or more cavities in order to actively vary at least one of the absorption coefficient α or the resonance frequency of said body; and

a structure provided with a roller upon which said at least one sound absorbing device can be wound and a drive mechanism for rotating said roller.

11. (previously presented) Sound-absorbing assembly according to claim 10 furthermore comprising at least one high-frequency absorbing device supported on the structure on a second roller upon which said high-frequency absorbing mechanism can be wound.

12. (previously presented) Sound-absorbing assembly according to claim 11, wherein the structure is formed as a housing for accommodating the low and high-frequency absorbing devices in an inactive state of the assembly.

13. (previously presented) Sound-absorbing assembly according to claim 10, further comprising a winding means for automatically winding up the low-frequency absorbing device.

14. (previously presented) Sound-absorbing assembly according to claim 11, where said high-frequency absorbing device is a sheet of fabric of a material with sufficient flow resistance to provide high-frequency acoustic absorption.

15. (currently amended) A method for variably absorbing sound from open air in a sound field ~~in~~ of open air, comprising the steps of:

introducing into the open air of the sound field a series of partially resilient bodies ~~body~~, each ~~the~~ body having

an acoustic mass and a compliance determining a resonance frequency and hence determining an active frequency region for substantial absorption of acoustic energy from the open air in said sound field, and

an active outer surface exhibiting a chosen acoustic resistance~~, such that~~ to acoustic energy in the open air of said sound field;

mounting each body in the open air of the sound field so that the active outer surface in the open air is in free and movable contact with ~~at least a portion of~~ the open air of the sound field and additionally the active outer surface is free and movable for absorption of acoustic energy from the open air of said sound field whereby said body absorbs acoustic energy in use from the open air of said sound field;~~,~~ and

providing each body with a closed volume having a gas pressure and in which each body is movable in use at least by movement of said active outer surface between states where the volume is one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, in order to change one of an absorption coefficient α or a resonance frequency of said body between a very high value and a very low value substantially lower than the very high value; and

actively varying the gas pressure of each of the closed volumes of said bodies ~~body~~ in the open air of the sound field, to thereby vary the at least one of the absorption coefficient α or the resonance frequency of said ~~body~~ bodies between the very high and very low values.

16. (currently amended) A method according to claim 15, further including the step of choosing the acoustic resistance of the ~~portion~~ active outer surfaces of said ~~body~~ bodies

that ~~is~~ are in contact with said the open air of said sound field such that a substantial impedance match exists between the ~~portion~~ active outer surfaces and the open air in the ~~surrounding~~ sound field.

17. (previously presented) A method according to claim 15, where the resonance frequency f_o, acoustic resistance ratio μ, maximum absorption coefficient α_{max} and absorption bandwidth B_r are given by

$$f_0 = \frac{c}{2\pi}\sqrt{\frac{\rho}{md}} \qquad (1)$$

$$\mu = \frac{r_i}{r_s} \qquad (2)$$

$$\alpha_{\max} = \frac{4\mu}{(1+\mu)^2} \qquad (3)$$

$$\frac{B_r}{f_0} = (1+\mu)\sqrt{\frac{\rho d}{m}} \qquad (4)$$

18. (previously presented) A method for reducing the reverberation time of a room at least in a low-frequency region from a given reverberation time T_{60} to a desired reverberation time $T_{60,S}$ comprising the steps of:

introducing into the room a sound-absorbing device which is placed in a sound field in air for absorbing acoustic energy from said sound field at least in a predetermined low-frequency region, the device including

a body containing one or more cavities, said body including an outer surface with at least a portion thereof in contact with said sound field, and being movable between

states where the cavities are one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, and

actively varying the gas pressure in said one or more cavities in order to actively vary at least one of the absorption coefficient α or the resonance frequency of said body; and

when variation of the gas pressure is no longer desired, winding up, on a structure provided with a roller, said sound absorbing device with a drive mechanism.

19. (previously presented) A method according to claim 18, where a required total surface area S_s of said body of said device is determined by the equation

$$\alpha = \frac{55.3V}{cS_S}\left(\frac{1}{T_{60}^S} - \frac{1}{T_{60}}\right) \qquad (5)$$

where α is the absorption coefficient of the absorbing device, V is the volume of the room and c is the speed of sound.

20. (previously presented) A method according to claim 18, where said reduction of reverberation time predominantly takes place in a low-frequency region determined by a resonance frequency and absorption bandwidth determined where the resonance frequency f_o, acoustic resistance ratio μ, maximum absorption coefficient α_{max} and absorption bandwidth B_r are given by

$$f_0 = \frac{c}{2\pi}\sqrt{\frac{\rho}{md}} \qquad (1)$$

$$\mu = \frac{r_i}{r_s} \qquad (2)$$

$$\alpha_{\max} = \frac{4\mu}{(1+\mu)^2} \qquad (3)$$

$$\frac{B_r}{f_0} = (1+\mu)\sqrt{\frac{\rho d}{m}} \qquad (4).$$

21. (previously presented) A system for reducing the reverberation time of a room comprising:

a plurality of sound-absorbing assemblies, each sound-absorbing assembly including

at least one sound-absorbing device which is placed in a sound field in air for absorbing acoustic energy from said sound field at least in a predetermined low-frequency region, comprising

a body containing one or more cavities, said body including an outer surface with at least a portion thereof in contact with said sound field, and being movable between states where the cavities are one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, and

a means for actively varying the gas pressure in said one or more cavities in order to actively vary at least one of the absorption coefficient α or the resonance frequency of said body;

a structure provided with a roller upon which said at least one sound absorbing device can be wound and a drive mechanism for rotating said roller; and

conduits through which the gas pressure can be supplied via a source to each of said assemblies and removed therefrom.

22. (previously presented) A system according to claim 21, wherein said assemblies are provided with valve means for controlling the gas pressure in said assemblies.

23. (previously presented) A system according to claim 22,

wherein said valve means are remote controllable, and

further including a central control device for controlling the gas pressure of said assemblies.

24. (previously presented) A system according to claim 21, further comprising means for measuring the reverberation time of the room.

25. (previously presented) A system according to claim 21, further comprising data storage means for storing measured reverberation times and corresponding parameters of the assemblies.

26-29. (canceled)

30. (new) Sound-absorbing system which is placed in a sound field of a room for absorbing acoustic energy from open air in the room at least in a predetermined low-frequency region, said system comprising:

a series of sound absorbing devices having first and second sides; and

a mounting means for mounting said series of said sound absorbing devices with at least one of said first and second sides having free and movable contact to the open air in the room; and

wherein each said sound absorbing device includes a body containing one or more cavities, each said cavity

i) including first and second opposed surfaces with one of said opposed surfaces forming in use the one of the first and second sides having the free and movable contact with the open air of the room and additionally being free and movable for absorption of acoustic energy from the open air of the room, and

ii) having a volume which is movable in use at least by movement of said active outer surface in the open air of the room between states where the volume is one of a) inflated and collapsed or b) extended and compressed, by a variation in a gas pressure therein, in order to change one of an absorption coefficient α or a resonance frequency of said body between a very high value and a very low value substantially lower than the very high value; and

a pressure means for actively varying the gas pressure in said cavities of said series of said sound absorbing devices in use in order to actively vary at least one of the absorption coefficient α or the resonance frequency of said bodies between the very high value and the very low value substantially lower than the very high value.

31. (new) Sound-absorbing system according to claim 30, where said low-frequency region has an upper frequency limit of approximately 200 Hz.

32. (new) Sound-absorbing system according to claim 30, where said low-frequency region is 50 Hz to 125 Hz.

33. (new) Sound-absorbing system according to claim 30, where a material of said body is chosen such that there exists a substantial impedance match between the body and the surrounding open air of the room field, at least in said low-frequency region.

34. (new) Sound-absorbing system according to claim 30, where at least one of said one or more cavities is provided with sound-absorbing material within said cavity.

35. (new) Sound-absorbing system according to claim 30, wherein said pressure means varies the gas pressure in at least two of said cavities separately from each other.